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Options for Expanded EPACT Program

EPA/DOE Collaboration

December 18, 2007

Base EPA Act Program Design

- Tier 2 fuel effects (RVP, T50, T90, Arom, EtOH)
- Fuel variables:
 - T50 (3 levels), T90 (2 levels), EtOH (E0 and E10), RVP (2 levels), Aromatics (2 levels)
- Computer generated optimal design of fuel matrix
- Emissions model will include:
 - Effects of ethanol content, T50, T90, aromatics and RVP
 - Nonlinear effects of T50
 - Five selected interactions between fuel properties
- 16 fuels, 19 vehicles in main program
- “GHG Pilot” to precede main program
 - Three additional, in-use E0, E10, E15 fuels tested in all 19 vehicles
 - GHG testing from early March till early June, 2008
- VOC speciation, some 50 deg F, no PM speciation
- N₂O, NH₃ and HCN by FTIR
- Estimated cost: \$3.45M
- Base Program Timeline
 - Jan. 2008 – March 2008: Fuel blending
 - March 2008 – March 2009: Emissions testing
 - March 2009 – May 2009: Reporting
- The Base Program is already moving forward

Expanded EPAAct Program

- \$0.9M has been made available to NREL from DOE's Biomass Program for use in expanding the EPAAct Study
- Additional \$1.1M may become available shortly (Dec. 19) from DOE's Vehicle Technology Program
- Expanded fuel matrix consists of the following 29 fuels:
 - Base fuel matrix (16 + 3 fuels)
 - Nine additional E15 and E20 fuels
 - E 85 fuel
- Emissions model will include nonlinear effects of ethanol
- DOE would like to test three high emitters for a total of 22 vehicles
- The add-on cost of the DOE component is estimated at \$1.85M
- Expanded Program Timeline
 - Jan. 2008 – April 2008: Fuel blending
 - March 2008 – September 2009: Emissions testing
 - September 2009 – December 2009: Reporting

Test Fuel Matrix

Base Program
(1-16)

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GHG Subset (17-19)

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Expanded Program
(20-29)

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E85

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Fuel #	T50	T90	ETOH	RVP	ARO
	°F	°F	%	psi	%
1	235	300	10	7	15
2	235	350	0	9	15
3	195	350	10	9	15
4	195	350	0	7	40
5	195	300	10	7	40
6	235	300	0	7	40
7	215	350	10	7	15
8	215	300	10	9	15
9	215	350	0	9	40
10	215	300	0	7	15
11	215	300	10	9	40
12	215	350	10	7	40
13	195	350	0	7	15
14	195	300	0	9	15
15	235	350	10	9	40
16	195	300	0	9	40
17	215	325	0	9	30
18	202	325	10	9	25
19	195	325	15	9	23
20	160	300	20	7	15
21	168.2	300	15.3	7	15
22	160	350	20	7	40
23	160	300	20	9	40
24	160	350	20	9	15
25	195	300	15.3	7	15
26	168.2	350	15.3	9	40
27	195	350	15.3	9	40
28	160	350	20	9	40
29	TBD	TBD	85	TBD	TBD

Expanded EPA Act Program (Cont'd)

- DOE also wants to consider the following:
 - Limited 20°F tests
 - Limited 100°F tests
 - Up to three intermediate (e.g. 75k) mileage vehicles
 - Limited PM speciation
- DOE component of EPA Act Program will be defined once the final amount is known
- If the additional \$1.1M does not become available, then:
 - The proposed fuel matrix expansion will not be possible
 - 9 fuels must be tested or none
 - The DOE component will be selected from among the following:
 - Limited number of additional fuels (e.g. E15, E20 or E85)
 - Additional high emitter and/or intermediate mileage vehicles
 - Limited 20°F and/or 100°F tests
 - Limited PM speciation
- A meeting w/NREL to finalize the scope of the expanded program will take place in Ann Arbor on January 8, 2008